

# SCIENCE

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## THE BIRD ON ITS NEST.

BY MORRIS GIBBS.

ALTHOUGH many interesting points in relation to the nesting habits of our friends, the birds, have appeared, I have yet to see anything concerning the position which the prospective parent assumes while incubating. The subject has been of much interest to me, and in the past years many observations have been made, which plainly indicate that the proprietors of nearly all nests "have their exits and their entrances." Many there are, as the kingfishers, woodpeckers, and other species, which reach their eggs by a single opening or burrow, and these of necessity must emerge from the same source; but all seem to have a well-defined position in sitting, as we shall see.

All can remember the attitude of the domestic hen, turkey, or goose, and how rarely this position is changed; and with the wild bird the tendency to a shift is even less, for with barn-yard fowls we can alter their posture by placing a board in a variety of positions about the nest, but with the inhabitants of the wood any interference generally results in desertion. The robin when building her nest often tries how her brooding breast is to fit the growing structure, and this, too, when a bare, flat platform gives no indication of the elevated sides to follow. Later, the male sits in the forming cup, and speculates, probably, on the outcome of his efforts, and views the outlook from the crotch. During the four days of egg-laying the female is not on, or rather in, the structure to any extent, unless the weather is cold or wet, and she assumes almost any position. It is only after the duties of incubation begin, a period which lasts fourteen days to a dot, that the robins adopt a standard, shared in by each of the pair. The male, who shares in the duties of sitting, when going to take his trick, almost invariably flies towards his mate in the same path, and arriving at the back door, just as his feet are about to touch the edge, the female is seen to dart forward between the branches which comprise the front door. This front door, as I prefer to call it, is then really the exit, and toward it the incubating bird always points her bill. It never directs toward the tree-trunk, and generally points towards an open space in the foliage when in a thick-leaved tree or bush.

With all birds, so far as I am able to learn, the exit is a point of observation for the sitter, from which it can get a view of friends and foes. The owls and hawks from an elevated position can command a fine view of the surroundings. With all aquatic birds the sitter almost invariably occupies a position presenting toward the water. Shore birds, as the sandpipers, rest on their nests in a position to best view the stream or pond. Rails and gallinules face the water, the latter usually building so that they can plunge from their homes directly into their favorite channels. The loon, who builds, or rather forms, its nest away out from shore in a mass of vegetable matter, usually the foundation of an old muskrat's house, invariably faces the open, deep water. From

that position it can slide into the lake at a second's notice. Anyone can prove this position of the loon by examining the premises when the owner is away. The nest proper is merely a trough-like depression, evidently formed by the bird's efforts at hollowing, rather than in building up the sides. This oblong depression is a foot and a half long and over ten inches wide, and the eggs are always placed from three-fifths to two-thirds of the distance from the front end.

In a large number of nests of the brown pelican, which I examined on an island in Indian River, Florida, all gave evidence that the old birds sat in one position, usually with the front to the water. It was interesting to note, that, although the very young birds, which occupied many of the nests, assumed no regular position, the larger young nearly all presented towards the shore.

In the case of ruffed grouse and quail, the position occupied while on the nest is invariably that which gives the best view of the surroundings from the more or less concealed retreat. Who ever heard of a grouse's nest where the old bird faced into the brush pile or toward the stump or log?

The arboreal sparrows, vireos, and many other smaller birds usually sit upon nests built on horizontal limbs, with the head from the trunk, and when the nest is much elevated the position is usually chosen so that the sitter will face the prevailing wind. Birds will nearly always, when on or off the nest, face the wind; and, if observations are taken, nearly all birds on the nest will be found in one position if a strong wind is blowing.

## FOOT DEFORMITY AS THE RESULT OF UNSCIENTIFIC SHOES.

BY W. M. L. COPLIN, M.D., AND D. BEVAN, M.D.

IN approaching the subject of scientific foot-dress, one of necessity combats the traditions, experiences, and fashions of centuries. If we are to judge of the foot coverings handed down to us as relics from the courts of France, Spain, England, and Germany, we can but conclude that for an extremely long period of time, probably eight or ten centuries, the dressing of the human foot has been, even in the so-called civilized countries, but slightly different, and only in degree, from the customs of the followers of Confucius for thousands of years. Fortunately for art, unfortunately for the history of civilization, so called, the artist of olden as well as modern times has not copied, except in portraiture, the cramped foot, the narrow toe, the elevated heel, and the pinched instep, which have long accompanied the human foot. It seems reasonable to suppose, however, that the Roman artist and critic, and the Grecian as well, fully attempted to give us the perfect foot as found in the well-developed Grecian woman of the day. The sandals worn at the time when Rome was in her splendor were undoubtedly so constructed as to afford ample opportunity for the development of the foot, and exhibit the beauty of its conformation. The gladiators, if we are to judge of their physique by the rude representations which are handed down to us from their times, trained in extremely loose-fitting sandals, and

fought their battles in "shin buskins," rarely wearing any foot covering at all.

The first criminal step taken was that of lacing the entire shoe; this error led rapidly to the pinching of the foot, and in order to retain the foot well forward in the shoe the high heel became a necessity. This is not the histological reason why the high heel was first put on the shoe, but it is evident to the thinker that, with the narrow toe worn during the reign of Queen Elizabeth, it would have been practically impossible to have prevented excoriation and severe rubbing of the heel had the shoe remained flat; hence to prevent this the heel was elevated, and the foot shot forward to the toe of the shoe, and its return toward the heel prevented by the elevation of its posterior extremity.

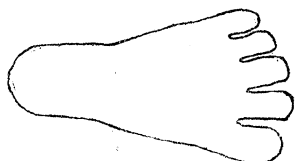


FIG. 1.—Infant's foot, never worn a shoe. Scale, three-eighths of an inch to one inch.

This can be but a brief *résumé* of the history of the improper foot-wear; it is sufficient to say, that, as fact, the wooden shoe or the cast shoe is more conducive to maintaining the normal contour of the foot than the pinchy leather shoe.

To return to the consideration of our subject proper, aside from the influence of evolution upon the human foot, we are to remember that the foot of a child as nearly represents the ideal of a perfect foot as anything of which we can conceive; so, taking that for a basis of our observation, let us glance for a moment at the essential features in maintaining the beauty of this small piece of God's handiwork.

As briefly outlining the course which the deformity of the foot pursues as the result of improper shoeing, the accompanying diagrams are presented. They are in no sense pictures, and are made by placing the foot upon paper and carefully tracing a continuous line around it; the same is true of the

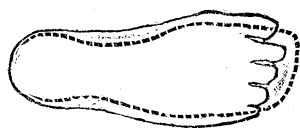


FIG. 2.—Five year-old child's foot, showing beginning deformity. Scale, two-eighths of an inch to one inch.

shoe except that it is drawn in broken lines. It will be observed that the broadest part of Fig. 1 is at the tip of the toes, that the toes are separated, that the pencil line can be readily made between the toes without displacing or pushing them aside. The foot is almost triangular in shape; from the tip of the little toe, a line projected backward will touch almost the entire length of the foot, and the inner margin of the big toe being continuous with the line at the side of the foot. The toes are straight, and when turned up, that is, fully extended, they will be separated from each other and evince perfect freedom of motion, both flexion and extension in all the phalanges. The instep is well arched, both on the plantar and dorsal surfaces; the foot is pliable; and, when extreme flexion is made, it will be manifest in the arch as well as in the toe; the heel is not found extending backward, it is round from above downward posteriorly and from side to side; there is no sharp angle, and the thickening

of the plantar skin begins gradually. This foot has never worn a shoe, and therefore does not show any of the evidences of the slowly developing deformity. Next we will consider the foot of a child five years old (Fig. 2). It will be observed that the great toe is beginning to deflect towards its fellows; the little toe deflects slightly towards the inner side of the foot; the greatest width of the foot is no longer at the tip of the toes but at the metatarso-phalangeal articulation; the toes can be but slightly separated by voluntary effort on the part of the individual. The toes are beginning to show slight stumping, and the overriding of the little toe and of its neighbor is beginning to manifest itself. The foot, although fat and plump, has not the smoothness, softness, and roundness which the infantile foot possesses. A line drawn from the heel along the outer or inner margin of the foot but slightly touches the great toe or the little toe at its base, and neither of them at their first phalangeal articulation. The tracing of the shoe shows exactly how the foot must be compressed in order to adapt itself to the shoe; and it is to be remembered that these drawings were made upon the outside of the shoe, and the foot must go on the inside of the covering of which this is an outside tracing. The narrowing of the toes must inevitably follow this pinching.

Passing on to the next degree, we have that of an adult foot (Fig. 3). The deformity here is sufficiently well marked to speak for itself; a step further it becomes more marked, and reaches its climax in Figs. 4 and 5, where we have a later stage thoroughly represented. Here the great toe is overridden by



FIG. 3.—Adult's foot, showing increased deformity. Scale, one-eighth of an inch to one inch.

thesecond toe, which lies parallel with the third toe; they are stumped, with nails and sides flattened. The fourth toe bends under the third toe. The bend at the first and second phalangeal articulation is angular, and both angles are surmounted by corns. The little toe bends far under the fourth toe, and at the metatarso-phalangeal junctions of the small toe and of the great toe articular enlargements are well advanced. Lines drawn along the outer and inner margin of the foot no longer touch either the great or little toe. The heel now projects backward as a result of the lacing to which the ankle has been subjected. The foot is flattened in the sole, and in some cases enlargement will be observed in the tarso-metatarsal articulation of the great or, more commonly, the little toe. These changes, as represented by the above succession of figures, are but the history of one foot, if it could be followed from infancy to adult life or later. The skin of the sole of the foot will be thick, and in no small number of cases corns will be situated either upon the heel or internal or external ball of the foot. During the development of these deformities the gait of the patient — for by this time the sufferer is a patient either of the doctor or the chiropodist — will have materially changed. Instead of the free, swinging gait of childhood and youth, easily and comfortably maintained, we have now the mincing, narrow gait with evident unsteadiness in the ankles, a tendency to prevent pushing forward of the foot and a manifest effort required in ascending or descending stairs or steps. There is a poorly developed calf as a result of the heel being highly elevated. The leg is narrow and flat; the calf is deficient and the tendo-achilles prominent. Climbing stairs, or go-

ing up hills, or working bicycles or pedals, or standing on tip-toe, or dancing, tires out the calf, produces pain in the hamstring muscle and a weakness in the back. These conditions are not rarely ascribed to ingrowing toenails, corns, or a tender foot, while in fact they are the legitimate outgrowths of slowly developing anatomical deformities. Added to the improper shape of the shoe and its



FIGS. 4 and 5.—Adults' feet, showing the advanced stages of deformity. Scale, one-eighth of an inch to one inch.

poor construction, we have the element of bad leather with stiff inflexible joining, all going as important factors of the development of the deformity. The question of the arrest of these changes, the prevention of deformity, lies, of course, entirely in properly made shoes. The shoe should certainly be the same width from the metatarso-phalangeal articulation to the tip of the toe. Crowding should be prevented. The soles should be flat, no heels to jab the foot forward upon the toes. The weight should be transmitted directly to the plantar arch, and not to the ball of the foot. Stockings should be wide and not taper at the toes, having a uniform width as in the shoe from the ball to the tip of the toe; they should be seamless in the area coming in contact with the toes and soles. The texture of both the stocking and the shoe should be pliable, and neither should be worn long enough to become saturated with moisture.

#### PHONETIC VALUE OF THE *CH'I* GLYPH IN THE MAYA GRAPHIC SYSTEM.

BY HILBORNE T. CRESSON, A.M., M.D.

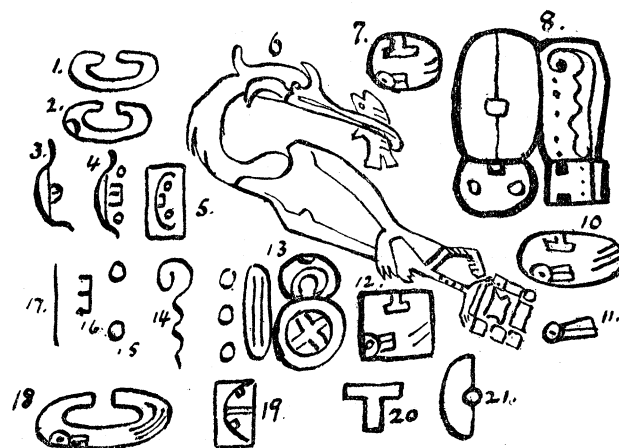
THE *Ch'i* glyph, which figures so extensively both in the hieratic and demotic script of the Mayas, seems to have been used in the most archaic forms of their graphic system, as it appears in their altar tablets of Copan (see Fig. 3 of the illustration accompanying this article), and it is also to be remarked among the ikonomatic decorations of various ancient Maya cities.

*Ch'i*, in Maya, means "to seize" or "hold" with pins, thorns, or claws, or other sharp-pointed objects; this would be clearly ikonomatic for *Ch'ic* or *Ch'i*. In 1876, while in Paris, it was my good fortune to examine, at the library of the École des Beaux Arts, an excellent photograph of the tablet to the left-hand side of the doorway of Casa, No. 3, Palenque, which, in a previous article published in *Science*, I have suggested is probably a bas-relief of *Kukwitz*. The design and technique of this masterpiece of the Maya scribe-sculptor's art is especially fine, particularly the ikonomatic decorations which ornament the figure of the god. The head-dress of the figure represents feathers, maize leaves, the quetzal head, and other decorations, notably that of a heron (*Baac-há*) in the act of pinching a fish (*cay*) in its powerful bill. The suggestion of *Baac-há* in the act of pinching *cay* in its bill (Fig. 6), although it recalled by means of the various phonetic components of the crane's head, neck, and eye, that the scribe intended to suggest to one's mind *ha-ca-ba*, or *hach kabah*, or it may be *ah kaba*, also suggested that *ch'i*, "to pinch," "bite," was implied by the action of the heron's bill. It would make the sentence more complete, for the fish, *cay*, is, in fact, but a determinative,

showing that *ch'd* is intended rather than *ch'i*, thus giving us "Ba-haá-chá" or "haá-chá-bá," an excellent rebus-like suggestion of *ah kaba*, which in Maya = "he who has a name." I notice that in the Casa, No. 2, tablet, Palenque, that the *main clouée* of Brasseur calls attention to "ah kaba," and a sculptured vase recently discovered in Yucatan, now in the Peabody Museum, has this same hieroglyph incised upon it in connection with other components which suggest *xma-kaba-kin* = "days without names." The so-called "nail-head" component of this glyph seems to have the phonetic value of *d*. It is absent, however, on the vase just referred to. In order to find out whether the *ch'i* glyph was used in other localities, a reference to Catherwood's drawing of the glyphs on the top of an altar at Copan, and various other sculptured tablets, indicates that it was used repeatedly by the Maya scribes. In one instance, at Copan, it recalls *Chikin*, the "west" or "sun-bitten." (Fig. 13).

The *ch'i* glyph has numerous variants, and seems to be accompanied by determinatives so as to indicate the vowel combinations, such as *chá*, *chā*, *ch'i*, *cho*, *chu*. We have called attention to a supposed determinative in a previous article published in *Science*, and one has already been referred to in this article. Where the glyph has no determinative whatever, as in Fig. 1, I accept it as *ch'*. If accompanied by the small circle, as in Fig. 2, I use it as *ch'i*. The sign of May orientation (Fig. 13), *Chikin*, the "west" or "sun-bitten," is an instance where this phonetic value has worked successfully. Where the *ch'i* glyph accompanied by two small circles (Fig. 15) placed on either of the tooth-like attachments (Fig. 16) which generally accompanies it, the phonetic value *ch'u* is suggested (see Figs. 4 and 5). Fig. 19 gives an admirable example of where two of the count-numerals are attached to the glyph; and, accepting it as a determinative, we obtain the phonetic value *ch'd*.

The *ch'i* glyph sometimes appears as shown in Fig. 18, and the resemblance of it to that of the day-sign, *manik* (Fig. 10), is striking. *Manik* has the same components,



only the outer line of the glyph encloses it completely, while in the *ch'i* glyph the two ends of the pinching claw, or hand, are left open. Where it is closed we have a glyph formed, as in Fig. 20, which is not unlike the draughtsman's T-square, and seems to have the phonetic value *ma*. The T-square glyph (Fig. 20) is used at Palenque, small ventilators in the walls of one of the houses being shaped like it. At *Ch'i Ch'een-Itza* it appears as an ikonomatic decoration on the walls of a temple, and the small component (Fig. 11), so often used in the Maya glyphs, also appears as an ikonomatic decoration at *Ch'i, Ch'een, Itza*. Its phonetic

value seems to be *ich*, as an affix, and *chi* as a suffix. In Fig. 18 it is a prefix and reads *ich*, suggesting that *ch'i* is the proper phonetic value to be used. The determinatives that we have referred to in this and other articles seem to be phonetic.

Fig. 3 is the *U* of Landa, and there is reason to think that it is correct, for the *o* or *u* attached to it is divided in half by a line which I believe, from results obtained in other directions, is the vowel *o* with the cut-line through it. In the various *Ch'u* (or *Ch'o*) glyphs (Figs. 4 and 5) that we have given this component of the glyph is square (Fig. 16). It has the cut-sign in the middle, or is divided by it, and gives a fair representation of teeth. *Co* = tooth in Maya (pronounced *Coo*), and, as in Figs. 3, 4, 5, the cut-sign runs to the perpendicular line (Fig. 17), whose phonetic value in my alphabet = *H*, either end of the *h* glyph touching the *ch* glyph, which envelops it externally, as in Figs. 3, 4, I accept it as a suggestion of *h'* or *ch'u*.

What we have designated as the cut-line, or sign, appears in other places. A good example is shown in Fig. 8. It is the well-known honey-sign, but in this case is combined with other glyphs. I act on a principle of analysis which so far has given good results, that the glyphs and Maya decorations are composed of ikonomatic components, and that the Maya scribe sculptor and his more demotic brethren do not seem to have used any meaningless decorations, either in their hieroglyphs or the ornamentation of their palaces, all these being in keeping with the words which they intended to convey to the reader's mind by the sound of the name of the thing represented. Fig. 8 is a glyph in the second row of the outer page of the Codex Troano. It is placed in front of Plate 35 of Brasseur's work. We will begin our analysis as follows: (a) The upper, left-hand glyph and the determinative sign below it on the lower, left-hand side; (b) the upper, right-hand glyph and the honey-sign below it at the lower, right-hand side. The *o* or *u* glyph is composed of the eye glyph, *ich*, or *uich*, placed on either side below the tooth-like appendage, *Co*. Just above it, in the elongated, oval glyph, is the *há* or *h* glyph, a line running through *o* or *u*, these two glyphs giving us an admirable suggestion of *ch'u* or *ch'o*. By taking half of this upper glyph it can easily be seen that the *u* of Landa (Fig. 3) is but a variant of this glyph (Fig. 21). The upper right-hand glyph (Fig. 8) has the dotted *sh* aspirate, together with the *i* loop and *l* curve. Descending from the *i* loop is the twisted glyph (or line), whose phonetic value I have so far used with success as *ba* (from *ba*, twisted, tortuous, bent). By trying every combination that can be obtained from this glyph and the preceding glyphs, I find that the following word was probably that intended by the Maya scribe, viz., "ch'u-h-oo-sh-il," or "ch'hucil." Turning to the vocabulary of Brasseur, which seems to suit this kind of work better than the dictionary of Perez, I find that the word in Maya means "sweets." This placed over the honey-sign, at the lower right-hand corner, indicates that we are not far astray in our analysis. The honey-sign has the two small, square, black, count glyphs attached to its left upper and lower corners = *ca*, or "two;" next comes our dotted aspirate line, which has the phonetic value *sh* or *x*; beyond this aspirate, to the left, is the *há* or *h*, a perpendicular line, giving us in connection with the other components and the aspirate "ca-há" (*b* is understood) = *cab*, or "honey." "Sweets-honey" is, I think, a fair interpretation of this glyph, which anyone who has studied the "Bee-Keeper's Narrative" of the Troano will recall as intimately associated

with honey and the honey-comb. Its component, *il*, is the antennæ of the bee, with the *i* loop attached.

This antennæ glyph I have shown in a previous article to be intimately associated with the honey-sign *Cab*.

The second *u* of Landa's alphabet (Fig. 14) is expressed by the *o* and *u* and the *l* curve to which the twisted glyph, *ba*, is attached. This gives us "Ho-ba;" and the aspirate of Landa, marked by the indented curve between the *il* and *ba* components of this sign, changes the *ba* into *há* or *ya*, giving us "Ho-ya" = "to water," "sprinkle." The *u* of Landa is often seen placed below the hieroglyph of the firmament, and is intimately connected with *há*, or "water which refreshes the earth with rain," "dew and moisture." *Ca*, *há*, *o*, *u* have an interesting relation with the *ch'i* glyph, and, from what we have related, seem to be determinatives.

The *ch'i* glyph is represented in many different parts of the Troano either as the claw-like appendage of the shell-fish, as in Plate 24 (b), Codex Troano, the centipede or tarantula claw, as in Plate 13, Troano (b.c.), Plate 18 (b), Plate 9 (c), or as the "pinching hand," with its crustacean-like thumb on Plate 25 (b), Troano.

#### DEATH OF PROFESSOR W. P. TROWBRIDGE.

PROFESSOR WILLIAM P. TROWBRIDGE, the head of the engineering department of the Columbia College School of Mines, died of heart-failure at his home in New Haven last Friday. He was born in Troy, Oakland County, Mich., May 25, 1828, and entered the West Point Military Academy in 1844, where he graduated four years later, receiving an appointment as second-lieutenant in the corps of engineers. He had served as Assistant Professor of Chemistry during the last year of his course at the academy, and after his graduation he was occupied for some time with astronomical work at the West Point Observatory. In 1851 he was appointed to a position on the Coast Survey under Superintendent Bache, which he held till 1856, and at a later time he took part in the survey of the James and Appomattox Rivers and in a series of surveys on the Pacific coast.

In 1854 he had received a commission as first-lieutenant in the U. S. Army, which he resigned two years later to accept the professorship of mathematics in the University of Michigan; but after a year of service, he resigned his professorship also, and was appointed scientific secretary to the superintendent of the Coast Survey. During the Civil War he again served in the army, and rose to the rank of brigadier-general; his work in the army being largely in connection with fortifications in New York harbor and elsewhere.

After the war was over he resigned his commission again, and entered the Sheffield Scientific School of Yale College as Professor of Dynamic Engineering, but resigned in 1877 to take the professorship of engineering at Columbia, which, as we have stated, he held up to the time of his death.

Professor Trowbridge was the author of a treatise on "Heat as a Source of Power" and several other works on engineering subjects. He was the chief agent of the tenth census for collecting statistics relating to power and machinery employed in manufactures. He was for four years Adjutant-General of Connecticut, was Vice-President of the New York Academy of Sciences and of the American Association for the Advancement of Science, and was a fellow of the National Academy of Sciences. For several years Professor Trowbridge was a director of the Science Company.

## NOTES AND NEWS.

THE question whether an attack of influenza confers protection from subsequent infection is one which must have often arisen during the experiences of the last three years, but the data for its solution are not yet fully available. The amount of information which must have been gleaned by the family practitioner in all parts of the country upon this and many other points concerning the malady would, if collated, go far to settle the matter. It is of course notorious that certain individuals have suffered from more than one attack; but the conviction is pretty general that such cases really form but a small minority of the large numbers who have suffered. Then, again, it must be deemed possible that the degree and duration of the protection may depend on the severity which the primary attack exhibited, for one can hardly invoke the doctrine of attenuation of virus in the case of this disease, which shows so much variation from the ordinary course of infective disorders in general. In a highly interesting contribution upon the features of the present epidemic in Berlin, according to *Lancet*, Dr. Ruhemann directs especial attention to this question of protection and affords valuable evidence of it. He aptly remarks that the more gradual evolution and persistent character of the present epidemic, as compared with the rapid and stormy course of the pandemic of 1889 to 1890, have afforded opportunity for more closely studying the character of the malady, and that it has especially enabled us to recognize more clearly its contagious nature. According to him, influenza has prevailed in Berlin ever since the beginning of last September, and he notes how on this occasion the stress of the outbreak had fallen to a far greater extent upon women and children and less upon men than was the case two years ago. His own practice affords proof of this, especially in the fact of the greater frequency of uncomplicated cases among women than among men. As to the question of protection, he has observed that members of families who were severely attacked two years ago have either escaped entirely at present or been only slightly affected; whilst, conversely, the most serious cases of the present time have arisen in households which the influenza spared during its earlier visitation. He notes the statement of Dr. Edward Gray, to the effect that "many persons who escaped the epidemic of 1775 were affected by that of 1782, and many who escaped the latter were affected by the former," as showing that a century ago this question of immunity had not passed unnoticed. Dr. Ruhemann gives his experience of 55 families, numbering 193 individuals. In 1889-90 there were 64 cases of influenza among this group, whilst in the present outbreak only 40 have been attacked, and, what is of special interest, only 5 out of this number were affected (and that but slightly) two years ago, whilst of the 64 then attacked only 4 have again become victims. Should this prove to be anything like the general experience it would go far to substantiate a fact that has hitherto been much disputed, even to the extent of declaring that one attack predisposes to another. That one individual may have several recurrences during the prevalence of a single epidemic does not, in Dr. Ruhemann's opinion, mitigate against the general doctrine of protection, since he thinks many such recurrences may be explained by lack of caution on the part of the patients against exposing themselves to fresh infection before they are restored to full health. That influenza does protect from a second infection should reassure many persons who, having once suffered severely from it, dread a repetition of so depressing a malady, and it may be further comfort to them to learn that the more they have to suffer at first, the less likely are they to suffer at all again. If, then, influenza shares this common property of all infective diseases, it is not so remarkable that it should not apparently select the young in preference to the adult and aged, seeing that the whole community is more or less "unprotected" when it first reappears after an absence (in pandemic form) of years.

— At the meeting of the Gesellschaft Deutscher Naturforscher und Aerzte held last year in Halle, it was arranged that the sixty-fifth meeting should be held this year at Nürnberg, from the 12th to the 16th of September. This society, similar to the English and American associations for the advancement of science,

together with a medical association, is divided into thirty-two sections, about two-thirds of which belong to the medical side, and the remaining are scientific, if it be allowed to use the word in the narrow sense. The three general sittings are to be opened by addresses from Professors His of Leipzig, von Helmholtz of Berlin, and Günther of Munich respectively; and in the meetings of the sections—for example, in chemistry—papers will be read, among others, by Ostwald and E. v. Meyer; in physics by Wiedemann and Boltzmann; in mathematics by G. Cantor, F. Klein and Königsberger. On one of the days of the meeting excursions are to be made by certain of the sections. Those of physics and zoology and some of the medicinal sections go to Erlangen, where the apparatus of the University laboratories will be used in demonstration of papers. On the same day the sections of botany, mineralogy, and geology, ethnology, and anthropology make a scientific excursion to Neuhaus or Pommelsbrunn. As before, the German Mathematical Society meets with the general Science Society, and thus the number of papers in the section of mathematics is probably larger than in any other section. There is to be a technical industrial exhibition in charge of the general society and the Bavarian government, and the Mathematical Society has undertaken an exhibition of "mathematical models, drawings, apparatus, and instruments, serving both for teaching and research in pure and applied mathematics." This latter exhibition is to include only those instruments having an interest primarily mathematical, while the instruments having to do with the experimental sciences, and of more practical use, are to be placed in the general exhibition, which will be especially rich historically, as the collections of the Nürnberg Industrial Museum are to be utilized. The mathematical exhibition is to include historical surface and curve models, such as those constructed by Plücker and Klein, and later those of the Brill collection; and certain unique models which have been in university collections, and which have become dilapidated, are to be as much as possible re-set. In connection with these models explanatory lectures are to be delivered, those thus far announced being as follows: Dyck, introductory lecture on the mathematical exhibition; Bjerknes, hydrodynamic phenomena analogous to electric and magnetic; Finsterwalder, surface curvature; Mehmke, reckoning machines. Other lectures are to be given on function-theory surfaces, etc. In this connection it is of interest to note that Professor Klein, who probably exerts the most influence in the German Mathematical Society, and who is a member of the mathematical advisory committee of the Chicago exhibition, suggests that such an exhibition of models with demonstrations be introduced there.

— For some eight years the theory has been before the scientific world that the great ice-sheet bridged the Ohio River near Cincinnati, Ohio, sufficiently to block its channel and raise the waters above the place of bridging to a height of 500 to 600 feet above the present river-bed. Silt deposits east of Cincinnati near the ice margin have been cited as evidence of this dam since they stand about 600 feet above the Ohio. These silts have been found by Frank Leverett, U. S. Geological Survey, Madison, Wis., to be too widespread to admit of this explanation, since they extend west past Cincinnati, covering much of southern Indiana as well as portions of States farther west. They are also of later date, since they rest upon the drift deposited by the ice when it bridged the Ohio, and are separated from it by a considerable time-interval, shown by humus stain, leaching of till, and erosion of surface of the underlying drift. The apparent absence of striæ south of the Ohio River and the meagre amount of drift there indicate a thin ice-sheet with feeble movement. These facts and a comparison with other districts where conditions for damming appear to have been more favorable than on the Ohio, lead to the conclusion that the river would not be blocked except for very brief periods.

— *Neptunia*, May, 1892, reports a singular phenomenon from the Balearic Isles. On March 4, about 9 o'clock in the morning, a violent wind from the north blew over Soller in Majorca. As the wind died away, the rain by which it was accompanied increased, and at the same time the ground was covered by a yellowish coating, which proved to be sulphur.

## SCIENCE:

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## THE AMERICAN PSYCHOLOGICAL ASSOCIATION.

IN response to an invitation issued by President G. Stanley Hall of Clark University, a preliminary meeting of psychologists from various institutions was held at that university, Worcester, Mass., on July 8.

The meeting was presided over by Professor G. S. Fullerton of the University of Pennsylvania. After a general expression of opinion as to the form of organization, it was determined to refer the entire matter to a committee consisting of President Hall of Clark University, Professor Fullerton of the University of Pennsylvania, Professor Jastrow of the University of Wisconsin, Professor James of Harvard University, Professor Ladd of Yale University, Professor Cattell of Columbia College, Professor Baldwin of the University of Toronto.

This committee was authorized to determine the place, time, and programme for the next meeting and then to report a plan of organization.

It was the sense of those present that these gentlemen should constitute a council to be renewed by frequent elections and should choose from their own number an executive committee to direct the more urgent affairs of the association, and that the first three gentlemen named should act temporarily as such committee.

Sessions were held in the afternoon and evening, at which papers were read by Professors Jastrow, Sanford, and Bryan, and Doctors Nichols, Krohn, and Gilman. It was decided in response to an invitation from Professor Fullerton to hold the next meeting of the association in Philadelphia, at the University of Pennsylvania, on Tuesday, Dec. 27, at 10 A.M.

Professor Jastrow was appointed secretary to provide a programme for that meeting. He invites all members to submit to him at Madison, Wisconsin, titles of papers with brief abstracts and estimates of time required for presentation.

The original members who were either present at this meeting or sent letters of approval and accepted member-

ship, are as follows: Frank Angell, Leland Stanford, Jr., University; J. Mark Baldwin, Toronto University; W. L. Bryan, Indiana University; W. H. Burnham, Clark University; J. McK. Cattell, Columbia College; Edward Cowles, McLean Asylum; E. B. Delabarre, Brown University; John Dewey, University of Michigan; G. S. Fullerton, University of Pennsylvania; E. H. Griffin, Clark University; G. Stanley Hall, Clark University; J. G. Hume, Toronto University; J. H. Hyslop, Columbia College; William James, Harvard University; Joseph Jastrow, University of Wisconsin; W. O. Krohn, Clark University; G. T. Ladd, Yale University; Herbert Nichols, Harvard University; William Noyes, McLean Asylum; G. T. W. Patrick, University of Iowa; Josiah Royce, Harvard University; E. C. Sanford, Clark University; E. W. Scripture, Yale University; Lightner Witmer, University of Pennsylvania; H. K. Wolfe, University of Nebraska.

The following additional members were elected: Dr. T. Wesley Mills, McGill College, Montreal; Hugo Münsterberg, Harvard University; A. T. Ormond, Princeton College; Edward Pace, Catholic University, Washington; E. B. Titchener, Cornell University.

Professor Jastrow asked the co-operation of all members for the section of psychology at the World's Fair, and invites correspondence upon the matter.

THE PEST OF FIELD-MICE IN THESSALY AND LOEFFLER'S SUCCESSFUL METHOD OF COMBATING IT.<sup>1</sup>

BY MEADE BOLTON.

THE valley of Thessaly was recently threatened with entire destruction of its growing crops by swarms of field-mice, which had suddenly appeared in such alarming numbers that the farmers and the government were at their wits' ends to discover efficient means to combat the pest. Several different poisons were tried at public expense, and it was also attempted to drown the mice out in some places; but owing to the difficulties of application and the inefficiency of these methods, it was found greatly desirable to look for other means. Pasteur was applied to by one of the large landowners for cultures of some microbe which could be used to destroy the mice, and Pasteur promptly referred his correspondent to Loeffler in Greifswald, who had discovered a bacillus which would answer the purpose. Pasteur's answer was sent to the government at Athens, and as the attention of the government had already been called to Loeffler's work by the Grecian ambassador at Berlin, Loeffler was requested to send cultures to be used in the infested districts. Fearing that the tests would not be made in such a manner as to secure success, Loeffler informed the Grecian ambassador, that, although he was willing to give the cultures, he would prefer to make the experiment himself, provided his expenses were paid.

On April 1 Loeffler received notice that if he would come the Grecian government was willing to pay his expenses and those of an assistant. So, after being informed that the mice were of the kind<sup>2</sup> that he had found susceptible to infection with his bacillus, Loeffler and his assistant, Dr. Abel, set out with a supply of cultures on April 5 from Berlin, and arrived in Athens April 9. On going to the pathological laboratory he was shown some of the mice from Thessaly, and to his chagrin he found they differed from the

<sup>1</sup> Centralblatt für Bacteriologie und Parasitenkunde Bd. XII., No. 1.<sup>2</sup> *Arvicola arvalis*.



kind he had worked on at home. Fortunately, however, it was found that the mice at Athens were even more susceptible to inoculation and also to infection through the alimentary canal than those in Germany. This fact was established in a few days by inoculating and feeding the mice in the laboratory with cultures of the organism. Preparations for experiment on a large scale were at once made, and Loeffler, Dr. Abel, and Dr. Pampoukis, director of the bacteriological laboratory in Athens, set sail on April 16 for Volo, and went by rail from thence to Larissa, the capital of Thessaly.

Loeffler had found that the micro-organism, *Bacillus typhi murium*,<sup>1</sup> grows very well in a decoction of oat and barley straw to which 1 per cent of peptone and  $\frac{1}{2}$  per cent of grape sugar have been added. So a large amount of this liquid was prepared and inoculated. Pieces of bread about the size of a finger were soaked in these cultures after abundant growth was secured, and the bread was then distributed in the openings of the burrows of the mice. A number of mice were also inoculated and turned loose; this was done because the mice eat the bodies of those that die, and spread contagion in this way. It had been amply proved by experiment that the bread soaked in the culture could be eaten by man and various domestic animals with perfect impunity.

In a few days after the holes had been baited, news came from all sides that the infected bread had disappeared from the holes. This news was very satisfactory, as it could by no means be certainly counted upon beforehand that the mice would eat the bread, surrounded as they were with abundance of fresh food. A visit to Bakrena, about nine days after the experiment had been started at that place, showed that the mice had ceased their activity entirely. In two other places, Nochali and Amarlar, a similar result was obtained. Several burrows at these places were opened and found to be empty or to contain sick, dead, or half-eaten mice. There were sick and dying mice sticking in many of the openings. A number of sick and dead mice were carried to Larissa, and examined. They were found to present all the characteristic lesions of the typhoid fever of mice, and to contain the organism in their internal organs.

Reports from other places which Loeffler subsequently received, were all satisfactory. So Loeffler is justified in closing his very interesting account of his expedition with the following words: "The science of bacteriology has thus again proved its great practical significance, and hence also its right to be specially cultivated and advanced."

#### LETTERS TO THE EDITOR.

\*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

#### The Ancient Libyan Alphabet.

IN *Science*, Aug. 12, Professor Keane offers some inquiries and statements relating to a note of mine on the Libyan alphabet.

The note referred to was partly based on an article by Dr. Collignon, as was indicated. Dr. Collignon is one of the highest authorities living on north African ethnography and archæology, as Professor Keane doubtless knows. He would not make the following statement unless he had good grounds for it: "Quant à la forme même des caractères libyques, on ne peut nier qu'elle ne remonte à une haute antiquité; elle est, en tout cas, antérieure à Carthage." Of course, Dr. Collignon is aware of the common theory that the letters were of Punic origin; but considers it time to discard it.

<sup>1</sup> Centralblatt f. Bacteriologie und Parasitenkunde Bd. IX., No. 5.

As to Professor Keane's suggestion of the origin of the name *tifinar*, from *Finagh* = Phœnician, it is purely fanciful, and his assertion that the stress "still falls on the root *fin*," is utterly incorrect, as it falls on the last syllable, and not on the penult (see Hanoteau, "Grammaire Tamachek," p. 5).

It is true that in loose language the whole alphabet, or any alphabet, is called *tifinar*; and it is not quite correct to say that all the *tiddebakin* are vowels. The proper distinction is thus given: "Les signes exclusivement tracés en traits sont nommés *tifinar*; ceux tracés avec des points sont nommés *tiddebakin*."

How Professor Keane, quoting Hanoteau's "Grammaire Tamachek," can deliberately write that in the Libyan alphabet "curves occur quite as frequently as straight lines," can only be explained by the supposition that he never saw the book he quotes. It is before me now, and out of the thirty-five simple and compound letters only three are curvilinear, and all of these are recognized as mere variants, and placed after the true rectilinear forms. I refuse to think that this is a fair example of the accuracy of Professor Keane's quotations.

Whether they were derived from a rectangle or not, has something more than theoretical importance in relation to their possible derivation from Egyptian forms; but it need not be insisted on. That all the original forms were composed of right lines is a point of considerable interest, which has not been disproved.

As to what writers may be considered specialists in the study, there is room for legitimate difference of opinion. When Professor Keane rejects Duveyrier, he rejects the author who beyond all others has a practical acquaintance with the written speech of the Touaregs—the only tribe who still use the *tifinar*. Professor Newman's works have been laid aside as substantially useless, on account of their phonetic system, by the best French scholars—notably René Basset; and Dr. Oudney never claimed to be an adept in the tongue.

D. G. BRINTON.

Media, Pa., Aug. 15.

#### Remarks on the Migration of Coleopters.

ONE might suppose, on simply looking at the map of the earth, that the animals of the northern hemisphere would exhibit a greater structural uniformity than those south of the equator.

In the north the continents on one side are separated only by the narrow Behring's Strait, on the other the Gulf Stream, and the prevailing west-east storms connect both continents, making migration of insects a possibility.

The similarity of climates of the northern half of the continents is less favorable to the production of generic varieties than are the southern lands, isolated by wide troughs of the ocean, with a variety of climes and altitudes; and, indeed, as we go northwards the varieties decrease in number.

If we abstract from the coleopterous groups genera which are most likely to migrate from one continent to the other by commerce, such as the Staphilinidæ, the Silphidæ, or the phytophagous insects, transportable in their food-plants, the rest of the forms will represent the aboriginal masses of 400 years ago.

In the far north above latitude 50°, and where Asia approaches so near to the American shores, the indigenous genera of both continents differ comparatively little; the genera are common, and some species are identical in both continents. Commerce in these regions was slight, even up to our days, and an uninterrupted natural development manifests itself everywhere.

True northern genera, such as the *Carabus*, *Calosoma*, and *Cychrus*, have species of strict similarity, such as *Calosoma sycophanta*, *inagator*, etc., extending from the Atlantic to the Pacific in the eastern continent, and *Cal. scrutator*, *calidum*, and *wilcoxii* in America; *Carabus cancellatus*, *clathratus*, and *monilis* on one side, *Car. serratus*, *limbatus*, and *vinctus* on the other, and *Car. truncaticollis* on both sides of Behring Sea.

If we assume that the land holding the greater number of species of one genus constitutes a centre of development, that is the birth-place of that genus. Accordingly, the genera *Cychrus* and *Calosoma* are to be taken as of American origin; the first being represented in Europe and Asia by four and in America by thirty species, the

latter in Europe by about half a dozen and in America by twenty-five species; while *Carabus* is represented in Europe and Asia by the respectable number of 100, and in America by a short dozen species.

My favorite family of *Poelaphidæ*, unlike their relatives, the *Staphilinidæ*, seem not very apt to migrate on the lines of commerce, but extend over a space of 60° latitude north and south.

In the colder regions of the north the species of one genus inhabiting both continents are very similar, while the tropical and southern genera, with a comparatively small number of species, differ in form so much that they can hardly be retained under one name.

Their habits, which suffer an involuntary modification by transportation through atmospheric forces into localities of different nature, produced in the fittest to survive changes of the most grotesque forms, and by repeated dislocations confined them in circumscribed localities.

This holds good for the tropical forms of this family in the large continents; but there are examples of genera occurring in places far apart. *Tmesiphorus*, *Tyrus*, and *Hamotus* are of that nature. To the latter belong *Upulona raffray* and *Cercocerus leconte*, which differ, according to M. Raffray, by the more elongated form of the last joint of the maxillary palpi in *Cercocerus*, and the former occurs in the Friendly Islands, and the latter, together with the rest of *Hamotus*, is found in the western regions and on the Pacific coast of America, north and south.

The streams of the Pacific Ocean are directed from west to east, and therefore would not allow a migration against the stream; consequently the original abode of those species must have been situated in the west of America, and their migration, considering the multiplication of forms in America, must date back to the remotest ages.

The *Tenebrionidæ* present a typical family of non-migrating beetles. The large majority of tenebrionide genera are wingless. They are slow in motion, and live on dead animal and vegetable matter. The generic forms of most of those in America are but distantly related to those of the eastern continent. The genera common to both continents are few, and the few immigrant species are winged, with one exception recently found — *Blaps mortiraga* — and such genera, which are at present assumed to be common to both lands (as *Asida*), owe their name to the now accepted basis of analytical marks.

The existence of these analogical forms can be explained only by the different geological and geographical conditions of the surface of the earth in remote ages. But there is always to be considered the axiom that similar conditions produce similar forms.

EMIL BRENDÉL.

#### Cause of a National Trait.

It is a matter of common observation that Hebrews, as a rule, are more than ordinarily devoted to their families, and their home-life is beautiful in many ways. As everything has a cause, the most plausible one in this regard appears to me to be the severe persecutions to which that race has been subjected for centuries, compelling clannishness and affording them their greatest happiness at home. Persistent influences acting through numberless generations would surely institute a racial peculiarity such as this.

S. V. CLEVINGER.

Chicago, Aug. 15.

#### Review of some Recent Publications of the U. S. National Museum.

FOR some time past the National Museum has been following the very desirable plan of issuing, in separate pamphlet form, the contributions of those authors who publish in the Proceedings or other reports of that institution. These pamphlets are uniformly contained in neat paper-covers, tasteful in color, and bear upon the outside page the title and author of the article and its number, from what standard publication of the Museum extracted, and, finally, the volume, pages, and plates (if any) of the latter. It would be well, indeed, if other institutions and societies always

followed suit in these last two features, for if one thing be more annoying than another to a worker in science with a working library, it is to receive reprints of papers that bear nowhere upon them this very important information; especially when an author desires to quote from reprints that have been submitted to him. At this date the Museum has issued a number of pamphlets of the character to which the attention of the reader has just been drawn, and it is believed that brief remarks upon these may prove to be of interest.

In No. 898 Mrs. M. Burton Williamson gives "An Annotated List of the Shells of San Pedro Bay and Vicinity," in which two new species are described by W. H. Dall. This list is brought quite up to date, carefully describes a great many species, is systematically arranged, and is illustrated by 33 excellent figures on plates. It will, no doubt, prove of use and value to the conchologists of the Pacific coast and elsewhere. Dr. Edwin Linton, in No. 893, gives some very full and valuable "Notes on Avian Entozoa," illustrated by nearly 100 figures of structural details. Entozoa found in specimens of *Larus californicus*, *Fuligula vulisneria*, *Oedemia americana*, and *Pelecanus erythrorhynchus* are described, in addition to parasites found in other birds collected by Mr. P. L. Jouy at Guaymas, Mexico. "One new genus was met with among the parasites of the duck, *Oedemia americana*. This genus, which I have named *Epision*, is characterized by a singular modification of the anterior part of the body into an organ for absorption and adhesion." In a brief paper, entitled "A Maid of Wolpai," with one plate, Dr. R. W. Shufeldt gives an account of the customs and dress of the young women of that Pueblo (No. 889); and the same writer, in another paper (No. 902) entitled "The Evolution of House Building among the Navajo Indians," describes the gradual improvement observed by him in the building of their houses by those Indians in New Mexico, since their contact with the whites. The paper is accompanied by three plates illustrating the subject. Lieut. T. Dix Bolles of the navy comments briefly on "Chinese Relics in Alaska" (No. 899, one plate), and from his studies of them he is forced to believe that at least two centuries ago a Chinese junk must have been driven upon the Alaskan coast. A very useful paper is that by Mary J. Rathbun, giving a "Catalogue of the Crabs of the Family Periceridæ in the U. S. National Museum" (No. 901), and it is illustrated by numerous figures of various species of that group. Papers of this class are especially desirable, and at the time of its appearance there were to be found in the collections of the Museum 48 species of *Periceridæ*, for which a valuable synonymy is given, with a "Key" to genera and species. Akin to this last is still another beautifully illustrated paper by Mr. James E. Benedict, on "Corystoid Crabs of the genera *Telmessus* and *Erimacrus*." Very little is known of these forms, and the writer's article is based on specimens collected in Alaska by Dall, and on the *Albatross* collections (No. 900). No less interesting are two admirable papers by Dr. Leonhard Stejneger, both of which are illustrated (Nos. 894, 904). The first gives a "Preliminary description of a new Genus and Species of Blind Cave Salamander from North America," — a remarkable form from the Rock House Cave, Missouri. "A new genus and species of salamander may not be such a startling novelty even at this late date, but the interest is considerably heightened when we have to do with the first and only blind form among the true salamanders." It has been named by the author *Typhlotriton spelæus*. Dr. Stejneger's second paper is of considerable length, presenting, as it does, extensive "Notes on a Collection of Birds made by Harry V. Henson in the Island of Yeso, Japan." It contains many excellent embryological plates. Professor Carl H. Eigenmann, in No. 897, makes a contribution to the study of "The Fishes of San Diego," in which "especial attention has been paid to the spawning habits and seasons, the embryology, and migration of the fishes of Southern California." The paper is of great economic value, and lacks not in interest to the anatomist.

Finally, we have three very thorough entomological articles from the pen of Dr. John B. Smith (Nos. 890–892). They deal with a "Revision of the Genus *Cucullia*; Revision of the *Dicopinae*; Revision of *Xylomiges* and *Morrisonia*" (plates II., III.). These contributions will be welcomed by the entomologist, fully



setting forth, as they do, characterizations of the several genera and species to which the author has given his attention.

R. W. SHUFELDT.

Takoma, D. C., Aug. 15.

### The Color of the Blood in Man.

HAVING recently examined a large number of specimens of human blood from persons of different ages ranging from four to seventy-six years, some being those in robust health, others being tuberculous, I was struck with the great difference in the shade of color presented, some being of a very rich tint, others very pale. The richest color was in the blood of a girl twenty-six years of age, a graduate of Vassar College, who had the highest anthropometric measurement for respiratory capacity in a class of about 500 girls. Her health was excellent, and she consumed rather more flesh-food than is usual. The next highest tint was found in the blood of a woman about seventy years old, with a somewhat unusual chest measurement, having also excellent respiratory capacity and being in fine health. This woman, on the contrary, does not eat flesh at all. I expected in her case to find a more than ordinary number of white blood corpuscles; but there were far less than usual, it being difficult to find them, they were so few. The palest blood was from a chlorotic Irish servant-girl of twenty-five years, and in a tuberculous boy of four. There was not much perceptible difference in their cases. The girl had naturally good respiratory power, but she had lessened it by tight clothing and an almost constant in-door life for a long time. After spending a month at the seaside, I examined her blood again, and found the tint somewhat deeper than before. As we know, the color of the blood is caused by the hæmoglobin in the red blood corpuscles, and if this is greater when the respiratory capacity is greatest, may not the color of the blood be heightened by enlarging the chest and increasing the lung-power? From some observations I have made I believe it can.

M. L. HOLBROOK.

New York, Aug. 16.

### Snake Eats Snake.

WHILE walking over a dry mesa, yesterday, I noticed a small snake slowly crawling to the shelter of a mesquit bush. On capturing it, I found it to be of a very dark olive-green color, in large, square pattern, the lines between the plaids being of lighter green; underneath, white, with very dark-green blotches. Its head was very dark green, and rather small; it had small fangs. The length of the snake was nineteen inches. Noticing that the body seemed much distended, I opened it, and found, nicely packed away inside, the body of an ordinary, brown, striped "grass snake," as we call them here, twenty-two inches long. This green snake may be a new species of snake-eating serpent. The grass snake is very swift, and I am puzzled to know how the green snake caught it; it was swallowed head-first.

C. W. KEMPTON.

Oro Blanco, Arizona, Aug. 8.

### Cleistogamy in the Pansy.

MR. DARWIN, in "Forms of Flowers," notes that, though cleistogamy is the rule in the genus *Viola*, the pansy, *Viola tricolor*, has not been known to exhibit it, though it does sometimes produce very small and closed self-fertilizing flowers, which would critically be termed cleistogamic if some portions of the floral organs were to abort. In our country this condition may more readily occur than in the Old World. In many localities the pansy has become partially wild and cleistogamy may be looked for. Mr. Chalkley Palmer has sent me some specimens in fruit, found wild in some place in New Jersey, which are certainly in one or the other condition noted by Mr. Darwin. They appear to be truly cleistogamic, but were too far advanced to determine with accuracy.

THOMAS MEEHAN.

Germantown, Pa.

### BOOK-REVIEWS.

*Annual Report of the Geological Survey of Arkansas for 1890.* Vol. III. *Whetstones and the Novaculites of Arkansas.* By L. S. GRISWOLD. Little Rock, Arkansas.

THE history of the rise and progress of geology in the United States remains to be written. It dates back to early in the century; for in 1807 McClure published a paper containing geological observations. Mitchell, Eaton, Dewey, Silliman, and hosts of others followed one another in rapid succession. Nor were the observations of private individuals all that appeared in the early decades, for in 1823 Olmsted published a report on the geology of North Carolina, as one result of a regularly organized State survey, while Hitchcock in 1831 reported upon the geology of Massachusetts. Between that date and 1840 State surveys had been organized and reports had been published in Maine, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Georgia, Tennessee, Kentucky, Ohio, Indiana, and Michigan. The general government, too, had sent expeditions to the north-west, Schoolcraft reporting upon the Michigan region as early as 1820. It is true that many of the State surveys ceased after the issuance of a few documents, but their existence even for a brief period was evidence of the belief in their value. Some of the States organized second surveys at a later date and published numerous volumes, among which New Jersey, Pennsylvania, Ohio, and Kentucky are especially to be noted. The survey of New York has been continued from 1837 until the present time.

In those olden times the State survey reports were general; observations were made over an extended area; profuse details were given of township or county geology; but no one subject was treated in an exhaustive manner. The result was that, when ten or a dozen or more volumes had been published, it still remained to collate and epitomize the information. For the States of New York, Pennsylvania,<sup>1</sup> Kentucky, Ohio, Illinois and others this has never been done, and the numerous volumes of these surveys are masses of details with full and comprehensive accounts of scarcely a single subject. Dr. Branner, as the State Geologist of Arkansas, has seen fit to change this ancient order of things, and as a result in his annual reports we have volumes describing the Mesozoic geology, the gold and silver fields, and the coal of the State, as well as exhaustive volumes on Manganese and the Novaculites. The first geological survey of Arkansas published two reports, in 1859 and 1860. The beginning of the war put a stop to the work, however, and it was not until 1888 that any further work in the State was published. The report for that year, and those for 1889 and 1890, of which the volume under review is the third, contain much information valuable alike to the State and to the world at large.

Whetting, or sharpening, is one of the ancient arts. That it was practised by early civilized man is evidenced by the existence in the Sanscrit of the word *ga*, meaning to sharpen or whet. From this comes the Latin *cos*, a whetstone, hone or flint-stone, and hence *cotaria*, a whetstone quarry. *Coticula*, meaning a small touch-stone, is also a derivative, and from this comes the French *coticule*, meaning a whetstone of a fine quality. *Novaculite* comes from *novacula*, a sharp knife or razor, and this in turn is derived from the Latin *novare*, to renew or to make fresh.

Many writers from Pliny down discuss whetstones or hones for sharpening tools. Linnæus used the word *novacula* in his time, and it was seemingly anglicized by Richard Kirwan into *novaculite* in 1784. Mr. Griswold believes, although all mineralogists do not agree with him,<sup>2</sup> that it is practicable "to revive the word as a scientific term, in its original sense, to denote a fine-grained, gritty, homogeneous, and highly siliceous rock, translucent on thin edges, and having a conchoidal or sub-conchoidal fracture. If this definition is strictly adhered to, no confusion will arise from the use of the word in commerce" (p. 18).

The knowledge of whetstones in America dates from 1818, when they were mentioned by Bringier as occurring in Arkansas.

<sup>1</sup> Professor J. L. Lesley is now engaged on this work, and Vol. I. of his final report has appeared.

<sup>2</sup> For example, G. P. Merrill in Annual Report U. S. Nat. Mus. for 1890, 1892, p. 525.

Since then they have been found in many parts of the country, no less than 106 localities being now known whence they have been obtained. All of these localities are naturally not equally good, and many of them are not now worked at all.

Some useful hints are given by Mr. Griswold in Chapter iv. on the purchase and care of whetstones, and especially that little-understood matter, the use of lubricants; and in Chapter v. the subject of manufacture of stones is discussed. This dates back to the beginning of the Christian era at least, for definitely-shaped hones are found at Pompeii. At present, in America, the stones mostly come from Indiana, Arkansas, New Hampshire, and Vermont; although there are other States producing them. The total out-put is small, and \$75,000 would represent the value of the manufactured product in 1880.

Of the Arkansas stone proper, considered a typical novaculite, only about 60,000 pounds are quarried annually. The most of this goes to New York to be manufactured, whence it is largely shipped back to Arkansas. The blocks are laid in plaster of Paris in the bed of the gang-saw, and the saws are so arranged as to waste as little as possible. The sawing is slow, "saws going at the rate of 80 swings per minute will only penetrate the stone in the gang-bed at the rate of  $1\frac{1}{2}$  inches in 10 hours. Marble is sometimes sawed at a rate of nearly 8 inches per hour, though for dense marble 2 inches per hour is a closer estimate." After the first cutting the slabs are sorted, and the useless pieces thrown away, this being done again and again as the pieces are reduced in size until only 25 per cent of the original amount remains as a marketable product. Of the Ouachita stone, a coarser variety of whetstone, a much larger amount is produced, this being in 1889 1,040,000 pounds. The method of cutting is about the same as for the Arkansas stone, while the waste is about 50 per cent.

Mr. Griswold deals extensively with the petrography of the novaculites, giving descriptions of numerous microscopic sections from various localities. The conclusions may be summed up as follows: Novaculite rocks were deposited in deep water as sediments, the carbonate of lime crystallizing as rhombohedrons. Consolidation of the siliceous portions produced a hard, brittle rock, which, being subsequently folded and elevated above the sea-level, was subjected to erosion. During this process the calcite crystals were removed, and subsequently a secondary deposit of silica took place.

In regard to the sedimentary origin of the rocks, Mr. Griswold says:—

"It may be somewhat difficult to conceive of a constant supply of very fine fragmental silica, almost totally without other materials, in sufficient quantity to form beds several feet in thickness with very thin layers of slate between, and making a formation from 500 to 600 feet in thickness, yet this seems to have been the manner in which these rocks were formed. After all, the conception is not so difficult when one considers that the fragmental silica of many of the slates and shales is as fine as that of novaculite, and as the percentage of silica in the sediments forming these rocks is increased, the resulting rock approaches more and more closely the novaculite. Thus with the novaculites are associated very argillaceous shales, grading into siliceous shales and then into transparent novaculites. The almost absolute purity of the novaculites still causes doubt as to the possibility of this mode of origin; but many coarse sandstones are nearly as pure, and if the novaculites can be considered as extensions of the sandstones toward the deep sea, where the finer fragments would settle, then we have at least a close approximation to the sediments forming the novaculites. That the same action which produces the angular fragments of quartz in sandstones must also afford a very large amount of exceedingly fine quartz is evident" (p. 192).

Many pages of the report are devoted to details of the geology of the novaculite area, but it is obviously impossible to enter into any of these here. A brief epitome only can be given of the geological history of the area, which in Mr. Griswold's words is as follows:—

"The sequence of events in this history seems to have been as follows: A deposition of very fine fragmental material on the deep-sea floor to form the Silurian strata, included in the upper part of which are two groups where graptolites abound. At the

end of the Lower Silurian deposition, through the periods known as Upper Silurian and Devonian, there was an almost total cessation of the deposition of sediments. There seem to be two possible explanations for this fact: First, there may have been a depression of the sea-bottom which left this area so far from shore that no thick sediments were accumulated over it, and this was followed by an elevation in Lower Carboniferous times renewing sedimentation in perfectly conformable beds; the second explanation is that while upper Silurian and Devonian beds were being deposited elsewhere, the same period was occupied by a deposition in the Arkansas area characterized by Lower Silurian organisms. This continued until a decided change of conditions in Lower Carboniferous times renders necessary a change in the nomenclature of the beds in consequence of the change in the character of the fossils.

"True Coal-Measure strata covered the novaculite area also, for they are found in Texas in a latitude considerably south of  $34^{\circ} 30'$ , while the trend of the formation is nearly east and west through this part of Arkansas and through the Indian Territory. The south members of the coal strata of northern Arkansas have been worn completely away, and are now buried beneath the Cretaceous and Tertiary deposits which cover southern Arkansas.

"Following the formation of the Coal Measures, and probably synchronous with the Appalachian uplift, came the elevation of Arkansas above sea-level. The time following this post-Carboniferous elevation of Arkansas has been one of erosion, though we have evidence of some periods of accumulation as well as denudation. The three periods of accumulation were the Cretaceous, Tertiary, and Pleistocene, during which there were partial and perhaps complete submergences of the area" (pp. 206-207).

The final chapter of the volume deals with the fossils of the area. These, it is true, are few in number, but seem to be sufficient to justify the assertion of the Lower Silurian age of the deposit. Dr. R. R. Gurley contributes some remarks upon the graptolites found in shales both underlying and overlying the novaculites. His conclusion is that two horizons are represented, one of Calciferous, the other of Trenton age. Comparisons are drawn between the Arkansas beds and those of Point Levis in Canada, Calciferous in age, and those of Norman's Kill in New York, of Trenton age. A number of new species or varieties are described by Dr. Gurley.

JOSEPH F. JAMES.

Washington, Aug. 11.

*Outlines of Theoretical Chemistry.* By LOTHAR MEYER. New York, Longmans, Green, & Co.

THE author of this volume is well known by the successive editions of his "Modern Theories of Chemistry" and by the share that he took in developing the periodic law of the elements. The larger work was translated some years ago by Professors Bedson and Williams; and the same translators have put this volume into good, readable English.

The author says (in view of the various works already published on theoretical chemistry): "I have not considered the requirements of students alone, but have been desirous of offering something to those friends of scientific investigation who have neither the intention nor the time to concern themselves with the details of chemical investigation, but wish to become acquainted with the general conclusions arrived at. With this object in view, I have abstained from too large a use of the numerical results of observations and measurements, and have avoided giving detailed descriptions of experimental methods. . . . The general—I may say the philosophical—review of the subject has been my chief aim, to which the details should be subordinated."

The author's purpose, as thus expressed, has been in good measure carried out. Chemists will prefer his "Modern Theories of Chemistry," if they would become really proficient in this aspect of the science; and to such this work may seem superfluous. But many, who are chiefly interested for practical reasons in chemical analysis or manufactures, may be glad to find so good an "Outline," compressed into 216 clearly-printed pages. The work is not made up of distinct chapters, but the sections seem to succeed each other in natural order, giving some prominence to the following topics: Atomic theory, the several methods of determining

molecular and atomic weights, the periodic law, valency, the constitution of chemical compounds, physical isomerism, density, fusion, refraction, solution, crystallization, diffusion, evaporation, constitution of gases, relations of heat to chemical change, dissociation, electrolysis, migration of ions, speed of chemical change, action of mass and avidity. The following sentences are from the concluding paragraph: "We have gradually receded from the idea of a static state of equilibrium of the atoms, brought about by their powers of affinity, and we now consider the atoms and the molecules, which are built up of atoms, as particles in an active state of movement. Their relations to each other are essentially determined by the magnitude and form of their movements. Chemical theories grow more and more kinetic."

Some Americans, at least, will dissent from the judgment of the author in still making the atomic ratio H:O equal to 1:15.96; but it may well be hoped that this well-balanced compend of leading theories, in its English dress, will widen the interest already shown in the philosophical aspects of this science. R. B. W.

*Deafness and Discharge from the Ear.* By SAMUEL SEXTON, M.D. Assisted by Alexander Duane, M.D. New York, J. H. Vail & Co. 89 p.

THE object of the writers of this small volume is to bring before the profession the merits of the operation of excision of the drum membrane and ossicles in cases of chronic deafness from catarrh. The theory of the operation is stated at length, and a number of cases in which it has proved successful are reported. It would have been more satisfactory if a complete tabulation of all cases had been offered, so that a more accurate estimate could have been formed as to results. From what is stated, however, the procedure is clearly one of much service in some instances.

*Human Origins.* By SAMUEL LAING. Illustrated. London, Chapman & Hall, 1892.

THIS is an exceedingly well-written and interesting summary of all the theories, facts, and mysterious questions connected with the origin of mankind on earth, by a somewhat remarkable man, whose previous works, "Problems of the Future" and "Modern Science and Modern Thought," met with a wide circulation in England. The author, Mr. Samuel Laing, the son of the translator of the Norse Sagas, comes of a good old Scottish family and was second wrangler of his year. Well-known in the House of Commons as "the member for the Orkneys," Mr. Laing twice served in Mr. Gladstone's administrations, as finance minister to India and financial secretary to the treasury, and is now the president of a prosperous English railroad. This veteran of finance and affairs has always found solace and delight in the study of abstruse scientific problems of the day. His various publications present the results of wide and discriminating reading and research, in a logical, concise, yet comprehensible style for the benefit of those who have not the time to look into such matters for themselves.

In the present volume Mr. Laing deals first with the abundant evidences of the existence of civilized man upon earth at least a thousand years before the date of the creation of the world as given by theological chronologists. A clear outline is presented of the condition of religion, art, science, and agriculture of "Old Time," as revealed by the earliest monumental records and inscriptions of ancient Egypt, Assyria, and Chaldea. These alone afford convincing proof of the great antiquity of civilized man and of the existence of a high grade of culture at the earliest dawn of the historical period, which was preceded by legendary ages of less duration and by the long-forgotten antecedent neolithic era and remoter epoch of palæolithic man.

The evidences of science are then considered as revealed in geological and palæontological records of the past. The effects of the glacial period, Croll's theory of its cause, and Quaternary, Tertiary, post-glacial, and inter-glacial and pre-glacial man are discussed in turn. The geological data from the Old and New Worlds, favorable and opposed to the antiquity of man, are stated with clear impartiality. The author seems well acquainted with the works of American scientists such as Abbott, Morton, Brinton, Wright, Whitney, and Shaler. He shares, however, in the prevalent confusion with regard to the Toltecs. His main argument is

governed by the force of the logical postulate of continuous evolution. "No one now believes," he writes, "in a multiplicity of miracles to account for the existence of animal species. Is man alone an exception to this universal law, or is he, like the rest of creation, a product of what Darwinians call evolution, and enlightened theologians 'the original impress?'" He is therefore led to the conviction of the great antiquity of the human race. He would seek for human origins at least as far back as the Miocene period, and search in the earliest Eocene strata for the collateral ancestors both of the existing races of mankind and surviving species of anthropoid apes. "With this extension of time," he concludes, "the existence of man, instead of being an anomaly and a discord, falls in with the sublime harmony of the universe, of which it is the dominant note."

The volume is well illustrated from varied and modern sources. There are a few obvious misprints, such as Tyler for Tylor, trilateral for triliteral, Mortillot for Mortillet; which will doubtless be corrected in the forthcoming second edition. The first is already exhausted.

AGNES CRANE.

Brighton, England, Aug. 1.

*Essays upon Heredity and Kindred Biological Problems.* By DR. AUGUST WEISMANN. Authorized translation by Messrs. Poulton, Schönland, and Shipley. New York, Macmillan & Co. 2 vols. 8°.

THOSE who have followed the active discussion of the remarkable investigations and stimulating hypotheses of the author of these volumes will not expect in this place a review of the works which have made his name famous even among those who have not been willing to accept all his conclusions. Such a review would be inadequately accommodated in a volume as large as either of those which are mentioned here. It would amount to a summary of existing biologic theory, which is being added to daily, almost hourly, and from which the teaching effect of time daily dissolves away some misconception or superfluity. In common with the great body of American naturalists we believe that the most talked-about strand in Weismann's woof of hypothesis — the assertion of the non-transmission of acquired characters — is not only an erroneous but an entirely unnecessary assumption, an assumption which, carried vigorously to its necessary conclusions, may well be termed the key-note of a genuine "gospel of despair." This assumption at present is upheld chiefly by a sort of circular argument which explains the "acquired character" to be one acquired by the body solely, exclusive of the reproductive plasma, while any character which is shown to be transmitted is put out of court as having been acquired by the "whole organism." But whatever be the fate of any of these special views, either of Weismann or his opponents, there can be no question as to the great importance of the questions involved, or of the scientific, honorable, and impartial spirit in which the great German naturalist has discussed them.

While many of the problems concerned are strictly scientific and to be adequately discussed by trained naturalists alone, some of the questions, and the conclusions which result from all, are of the utmost importance to every philosopher, theologian, and sociologist. It is therefore a matter for general congratulation that the essays in question have been put into English in a form which excludes all doubt as to the adequacy of the translation or the faithfulness with which his ideas have been presented.

The work appears with the well-known elegance of the Oxford Press, and should find a place in every working library.

*Darwin, and after Darwin, an Exposition of the Darwinian Theory, and a Discussion of Post-Darwinian Questions.* By GEORGE JOHN ROMANES. I. The Darwinian Theory. Chicago, Open Court Publishing Co. xvi., 460 p. 8°.

This treatise, the first of two contemplated volumes, has grown out of a series of lectures delivered before the University of Edinburgh, and is devoted to the general theory of organic evolution as Darwin left it. As these lectures were delivered to learners, and in their present form are intended for the general reader, the author states that he has been "everywhere careful to avoid assuming even the most elementary knowledge of natural science"

on the part of his readers. The natural consequence of this is that, for the intelligent American reader, who has learned his scientific alphabet long since, the book is liable to appear somewhat prosy and verbose. Having said this, our criticism is concluded, for it is certain that Mr. Romanes is fully conversant with his subject in all its branches, and a careful examination of the book has shown his treatment of the subject to be judicious, accurate, and fair. For all persons who desire a straightforward statement of what is implied by the term Darwinism when strictly construed, the book is to be recommended. Since public speakers, both in favor of and opposed to the doctrines of evolution and natural selection, are only too frequently given to singular misconceptions on this subject, it is fortunate that a work has at last appeared which presents a satisfactory summary of the theory for general reference, and we hope it may be widely circulated and carefully read by the numerous class for whom it is intended. Besides numerous diagrams of fairly good quality, the volume is embellished with Jeens's well-known portrait of Darwin, from the "Nature" series, which will be welcome to all admirers of the great philosopher.

*The Indians of Canada; their manners and customs.* By JOHN McLEAN. Third Edition. London, Charles H. Kelly. 351 p.

MR. McLEAN speaks from the experience of nine years spent among the Indians of the North-west, and is therefore excellent

authority for what came within the scope of his studies. These embraced the languages, literature, native religions, folk-lore, and later Christian life of the wild tribes. He talks in an interesting manner about their heroes, traditions, mode of living, and customs, and describes the land in which the tribes he visited pass their lives. The impression the book gives, however, is that it has been written down to a popular style, and that the author could have prepared a much more valuable production, had he not felt it necessary to consult what he considered the taste of the average reader.

#### AMONG THE PUBLISHERS.

THERE is now in press a work specially written for the Jewish Publication Society by Israel Zangwill, of London. It is entitled "Children of the Ghetto, being pen-pictures of a peculiar people." It will be forwarded to members in the forthcoming autumn. Arrangements have also been made for the publication, this year, of the second volume of Graetz's "History of the Jews."

—Close upon the recent invasion of Manhattan Island by thousands of enthusiasts in the cause of the elevation of the human race, comes the dread news, says *The Publishers' Weekly*, of the stealthy entry of two enemies that has struck terror into the heart of every man who owns a book worth having. So wily has been their insinuation into our midst that it would be difficult to

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Wanted, in exchange for the following works, any standard works on Surgery and on Diseases of Children: Wilson's "American Ornithology," 3 vols.; Coues' "Birds of the Northwest" and "Birds of the Colorado Valley," 2 vols.; Minot's "Land and Game Birds of New England"; Samuels' "Our Northern and Eastern Birds," all the Reports on the Birds of the Pacific R. R. Survey, bound in 2 vols., Morocco; and a complete set of the Reports of the Arkansas Geological Survey. Please give editions and dates in corresponding. R. ELLSWORTH CALL, High School, Des Moines, Iowa.

To exchange Wright's "Ice Age in North America" and Le Conte's "Elements of Geology" (Copyright 1882) for "Darwinism," by A. R. Wallace, "Origin of Species," by Darwin, "Descent of Man," by Darwin, "Man's Place in Nature," Huxley, "Mental Evolution in Animals," by Romanes, "Pre-Adamites," by Winchell. No books wanted except latest editions, and books in good condition. C. S. Brown, Jr., Vanderbilt University, Nashville, Tenn.

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A YOUNG MAN, with a thorough training in Analytical Chemistry (including analysis of minerals, food, water, etc.), and holding a diploma of the School of Practical Science, of Toronto, and good testimonials, desires a position as Analytical Chemist or as assistant to such. Address to WM. LAWSON, 16 Washington Ave., Toronto, Ontario.

A JOHNS HOPKINS graduate (1892) desires a position as instructor in mathematics and physics. Address A. B. TURNER, Johns Hopkins University, Baltimore, Md.

WANTED.—A collection of postage stamps; one made previous to 1860 preferred. Also old and curious stamps on original letters, and old entire U. S. stamped envelopes. Will pay cash or give in exchange first-class fossils, including fine crinoids. WM. F. E. GURLEY, Danville, Ill.

WANTED.—To purchase laboratory outfit; balances, evaporating dishes, burettes, etc., wanted immediately for cash. C. E. SPEIRS, 23 Murray street, New York. P. O. Box 1741.

fix the exact date of their immigration. Their history really begins with the fine morning, last week, on which Mr. W. E. Benjamin of 751 Broadway, New York City, took from his shelf a worn leather-bound copy of Seneca, published in London in 1675, and found two healthy specimens of the genus *Aglossa pinquinalis* ensconced in a burrow through the bottom of the precious book.

—Harper & Brothers have in preparation an illustrated edition of Green's "Short History of the English People," a work which has probably been more widely read and enjoyed than any other of its kind. The illustrations have been selected with the purpose of carrying out the favorite wish of the author, to interpret and illustrate English history by pictures which should show how men and things appeared to lookers-on of their own day, and how contemporary observers aimed at representing them. Besides a large number of elegant wood-engravings, the work will contain several colored plates, including reproductions from manuscripts, illuminated missals, etc., executed in the highest style of chromo-

lithography. An exhaustive series of portraits of eminent persons will also be a prominent feature. The first volume may be expected shortly.

—Prof. Bernard Bosanquet of London, whose "History of Aesthetics" has recently been published by Macmillan & Co., has just completed a course of fifteen lectures at the School of Applied Ethics, Plymouth, Mass. His theme was an historical survey of Greek ethics, tracing to the present day the influence of Plato and Aristotle. In clearness, precision, and in power to interest and stir his hearers Mr. Bosanquet proved as effective a teacher as England has ever sent across the sea. His ability as a thinker has been familiar to American students through his work on logic, which takes high rank as an authority. A recently published volume in the Contemporary Science Series presents his "Essays and Reviews," showing him to be one of the most incisive and sympathetic writers of the time in the fields of ethical and philosophical inquiry. Mr. Bosanquet intends to visit Colorado and the Yellowstone region before returning to England next month.

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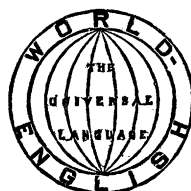
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